

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-42. (Canceled)

43. (Currently amended) A method of manufacturing a fiber reinforced cement composite material, comprising:

providing cellulose fibers;

treating at least a portion of the cellulose fibers in solution with about 5 to 10% by fiber mass with one or more sizing agents in the presence of water or an organic solvent for more than 1 hour and less than about 28 hours, wherein the sizing agent comprises a hydrophilic functional group and a hydrophobic functional group, wherein the hydrophilic group chemically bonds to at least some of the hydrophilic sites on inner and outer surfaces of the fibers to form sized fibers, wherein the sizing agent substantially blocks the hydrophilic sites, thereby reducing the fibers' affinity toward water;

mixing the sized fibers with about 30 to 45% cementitious binder and about 38 to 60% ground silica, and at least one of density modifiers and additives to form a fiber cement mixture;

forming the fiber cement mixture into a fiber cement article of a pre-selected shape and size; and

precuring the fiber cement article for about 6 to 8 hours at ~~30 to 45°C~~ ambient temperature so as to form the fiber reinforced composite building material.

44. (Currently amended) The method of Claim 43 ~~47~~, wherein curing comprises autoclaving said article for about 10 to 24 hours.

45. (Previously presented) The method of Claim 44, wherein the article is autoclaved at about 175 to 185°C.

46. (Canceled)

47. (New) The method of Claim 43, further comprising the step of curing the fiber cement article.

48. (New) The method of Claim 43, wherein treating the fibers in solution comprises having a reaction retention time of between about 5 seconds to 28 hours.

49. (New) The method of Claim 43, wherein the fibers are treated at a reaction pressure greater than 1 atm.

50. (New) The method of Claim 43, further comprising mixing the sized cellulose fibers with natural inorganic fibers and synthetic fibers.

51. (New) A method of manufacturing a fiber reinforced cement composite material, comprising:

providing cellulose fibers;

individualizing the cellulose fibers;

treating at least a portion of the cellulose fibers in solution with about 5 to 10% by fiber mass with one or more sizing agents in the presence of water or an organic solvent for more than 30 minutes and less than about 28 hours at a temperature of up to about 200° C, wherein the sizing agent comprises a hydrophilic functional group and a hydrophobic functional group, wherein the hydrophilic group chemically bonds to at least some of the hydrophilic sites on inner and outer surfaces of the fibers to form sized fibers, wherein the sizing agent substantially blocks the hydrophilic sites, thereby reducing the fibers' affinity toward water;

conditioning the individualized cellulose fibers to a total solid content of about 4% to 90%;

mixing the sized fibers with about 30 to 45% cementitious binder and about 38 to 60% ground silica to form a fiber cement mixture;

forming the fiber cement mixture into a fiber cement article of a pre-selected shape and size;

precurcuring the fiber cement article for about 6 to 8 hours at ambient temperature so as to form the fiber reinforced composite building material; and

autoclaving the fiber cement article for 24 hours or less at about 60° to 200° C.

52. (New) The method of Claim 51, wherein the cellulose fibers are individualized at 150 to 250° C for 30 minutes to 2 hours;

53. (New) The method of Claim 51, wherein the cellulose fibers are individualized by hammermilling;

54. (New) The method of Claim 51, wherein the step of mixing further includes at least one density modifier.

55. (New) The method of Claim 54, wherein the step of mixing does not include an additive.

56. (New) The method of Claim 51, wherein the step of mixing further includes at least one additive selected from the group consisting of silica fume, geothermal silica, pigments, colorants, plasticizers, dispersants, forming agents, flocculents, silicone materials, aluminum powder, mica, calcium carbonate, wollastonite, and polymeric resin emulsion.

57. (New) The method of Claim 56, wherein the fiber cement mixture consists essentially of:

- about 8% individualized cellulose fibers;
- about 35% cementitious binder; and
- about 57% ground silica.

58. (New) The method of Claim 57, wherein treating at least a portion of the cellulose fibers in solution is about 10% by fiber mass.

59. (New) The method of Claim 58, wherein the fiber cement mixture is precured for 8 hours at ambient temperature.

60. (New) The method of Claim 59, wherein the fiber cement mixture is cured by autoclaving for 12 hours at 180° C.

61. (New) The method of Claim 56, wherein the fiber cement mixture consists essentially of:

- about 7% individualized cellulose fibers;
- about 30% cementitious binder; and
- about 63% ground silica.

62. (New) The method of Claim 61, wherein the fiber cement mixture is precured for 8 hours at ambient temperature.

63. (New) The method of Claim 62, wherein the fiber cement mixture is cured by autoclaving for 12 hours at 180° C.

64. (New) The method of Claim 56, wherein the fiber cement mixture consists essentially of:

- about 10% individualized cellulose fibers;
- about 39% cementitious binder;
- about 39% ground silica;
- about 10% calcium silicate hydrate; and
- about 1.5% methylcellulose.

65. (New) The method of Claim 64, wherein the fiber cement mixture is cured by autoclaving for 24 hours at 180° C.

66. (New) The method of Claim 51, wherein the sizing agent solution does not include an alkali metal aluminate.

67. (New) A method of manufacturing a fiber reinforced cement composite material, comprising:

- providing cellulose fibers;
- individualizing the cellulose fibers;
- treating at least a portion of the cellulose fibers in solution with about 5 to 10% by fiber mass with one or more sizing agents in the presence of water or an organic solvent lacking alkali metal aluminates for more than 30 minutes and less than about 28 hours at a temperature of up to about 200° C, wherein the sizing agent comprises a hydrophilic functional group and a hydrophobic functional group, wherein the hydrophilic group chemically bonds to at least some of the hydrophilic sites on inner and outer surfaces of the fibers to form sized fibers, wherein the sizing agent substantially blocks the hydrophilic sites, thereby reducing the fibers' affinity toward water;
- conditioning the individualized cellulose fibers to a total solid content of about 4% to 90%;
- mixing the sized fibers with about 30 to 45% cementitious binder and about 38 to 60% ground silica to form a fiber cement mixture;
- forming the fiber cement mixture into a fiber cement article of a pre-selected shape and size;
- precuring the fiber cement article for about 6 to 8 hours at ambient temperature so as to form the fiber reinforced composite building material; and
- autoclaving the fiber cement article for 24 hours or less at about 60° to 200° C.